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physiological or psychological, in producing the reaction word. Yet to suppose that this was regularly the case would be to leave the origin of the reaction word completely unexplained. It certainly seems likely that in the majority of cases where a reaction word occurs with no other demonstrable reason for its occurrence, the reason is to be found in a link which immediately afterwards presents itself to the observer's consciousness: the burden of proof would lie upon the person who should deny such an explanation. Very likely some of the cases which we classed as mediate associations do not properly belong under that heading. But we are convinced that the method furnished us with a number of associations whose link was physiological rather than psychological.

The peculiar feature of our method lies in the nature of the instructions given to the observer, and it will be well to summarize in closing the effects which those instructions had. The instructions set up, as it were, a barrier against the occurrence of the series of processes that would have followed upon the stimulus word in ordinary association experiments. What was the nature of the processes which, to continue the figure, got past the barrier? They were, briefly, the following:

(a) Sound associations. The instructions diminished attention to meanings, since through meanings associations most conspicuously arise, and sound associations consequently took on increased influence.

(b) Perseverating ideas from recent experiences. The checking of the train of ideas which would be naturally suggested by the stimulus offered an opportunity for these to assert themselves.

(c) Perseverating reaction words, and to a less degree perseverating stimulus words, but not those used in immediately preceding experiments.

(d) Words associated through sound or meaning with perseverating reaction or stimulus words, even those of the experiment immediately preceding.

(e) Directly associated ideas which are, however, not sufficiently attended to to make the fact of their association clear: this failure to conform to the conditions of the experiment is probably due to the instructions themselves, which naturally have a tendency to direct attention away from the ideas suggested by the stimulus word, and in these cases simply allow the associative connection to be overlooked.

(f) Ideas which are connected with the stimulus word by an intermediate process which has no conscious accompaniment: mediate associations.

XIX. A STUDY OF THE IMAGES REPRESENTING THE CONCEPT "MEANING"

By MARY, W. CHAPIN and M. F. WASHBURN

"I see meaning as the blue-grey tip of a kind of scoop, which has a bit of yellow above it (probably a part of the handle), and which is just digging into a dark mass of what appears to be plastic material. I was educated on classical lines; and it is conceivable that this picture is an echo of the oft-repeated admonition to 'dig out the meaning' of some passage of Greek or Latin. I do not know; but I am sure of the image. And I am sure that others have similar images. I put the question not long since to the members

of my graduate seminary, and two of the twelve students present at once gave an affirmative answer. The one reported the mental unrolling of a white scroll; what he actually saw was a whitish lump or mass, flattened and flattening towards the right. The other reported a horizontal line, with two short verticals at a little distance from the two ends. The suggestion in these two cases is plain enough: meaning is something that you find by straightening things out, or it is something that is included or contained in things. There was, however, no such suggestion in the minds of my informants: for them, as for me, the mental representation of meaning is a simple datum, natural and ultimate."

This passage, from page 19 of Titchener's "Experimental Psychology of the Thought Processes," down to the sentence beginning, "The suggestion in these two cases," was read to a large class of beginners in psychology, and they were asked each one to introspect as carefully as she could the nature of the imagery which in her mind stood for the idea "meaning;" that is, represented not any particular meaning, but meaning in general. The students, all women, responded with written accounts that bore the marks of excellent introspection in the great majority of cases, considering that they had had but little training. One hundred and ninety-three good papers were received.

All of the imagery described was either wholly visual (50%), wholly kinaesthetic (36.7%), or visual and kinaesthetic combined (13.3%). Besides this classification according to modality, the images reported may be divided into the two groups of relevant and irrelevant. Relevant images are images whose connection with the word "meaning" through ordinary associative processes may be traced: Titchener's "blue-grey scoop" is a relevant image, because it can be traced to the idea of "digging out the meaning." In the case of irrelevant images no reason can be given to explain the suggestion of the image. The proportion of irrelevant images was decidedly greater where the imagery was visual than where it was kinaesthetic. The following statement summarizes the images in each class.

KINÆSTHETIC IMAGES

a. *Relevant*

Movements of the head or parts of the head. Frowning, 28. Nodding forward, 7. Sensations from head and throat, 3. Sensations from throat, 2. Stiffening of jaw, 2. Lips forming word, 4. Lip tension, 1. Mouth tension, 3. Teeth set, 2. Eye muscles tense, looking intently, 3. Looking into space, 1. Eyes closed, 2. Eye movements up and down as in looking up word in dictionary, 1. Eyes narrowed, 1. Lifting eyebrows, 2. Wrinkling nose as in pronouncing word emphatically, 1. Shaking head, 1. Turning head to get behind it, 1. These ideas are all classed as relevant, because they are all movements connected either with general effort, such as would be felt in trying to get at the meaning of something obscure, or with pronouncing the word, or with trying to see something; they are all movements that might be made in connection with getting at the meaning of something.

Movements of arm. Stretching up, 2. Grasping, 2. Fist clenched, 2. Grasping something and shoving it away, 1. Raising hand to head, 1. Pulling out a tangle, 1. Pushing against something hard, 1. Pushing forward, 1. Pointing with right forefinger, 1. Groping in the dark, 1.

The connection of all these with the word "meaning" is fairly clear: meaning is something to be reached for, grasped, pointed to, groped towards, disentangled: the pushing, fist clenching, and putting the hand to the head seem to represent merely effort in general.

Breathing movements. Catching breath, 1. Breathing slow and half suspended, 1. These apparently signify effort.

Movements involving the trunk. Leaning forward, 1. Inhibition of all motion, with sensations of effort, 1. Relaxing all the muscles, 1. The leaning forward, like the movements of intent looking, is apparently connected with the effort to *see* meaning. In the relaxing of effort we have the only kinæsthetic image which represents meaning as found or perceived: all the other images of this class are connected with the process of finding meaning, which involves effort, strained attention, frowning, fixed gaze, and so on.

Movements for which the part concerned is not specified. Penetrating dark mass, 1. Delving into something, 1. Poking around in corners, 1.

It is evident that the relevant kinæsthetic images suggested by the word "meaning" fall into two groups. In the first place, we have images of the movements which accompany effort to find the meaning of something, and in one case the movements of relaxation which accompany the discovery of meaning. All these movements are intimately and naturally connected with the process of seeking meaning; their connection with it involves nothing symbolic or figurative. In the second place, we have images of movements which symbolize the mental process itself of seeking for meaning. Reaching, pointing, grasping, disentangling, groping: these are not movements which one actually makes when trying to think of a meaning, as frowning is. They are movements which are thought of in connection with the process because they have some analogy to what goes on in the mind at such a time. It is noteworthy that all these symbolic movements are movements of hand and arm. It is the arm and hand muscles alone which naturally take part in movements that are signs voluntarily used; movements of the facial muscles and of the trunk are more commonly connected with the involuntary, natural expression of experiences. The movements involved in articulating the word must of course be excepted.

b. *Irrelevant*

Only a single kinæsthetic image was reported whose connection with the word could not plausibly be traced. This was the image described as "dragging down till one strikes hard bottom." Very likely it was really relevant in a symbolic way, and was derived from the idea of "getting to the bottom of things;" if the word had been "digging" instead of "dragging," the connection would have been clear.

How far these processes which we have classed as kinæsthetic images were actual sensations resulting from movements at least incipiently performed, we cannot say. Our observers were unequal to the very difficult introspective task of distinguishing between kinæsthetic sensation and kinæsthetic image.

VISUAL IMAGES

a. *Relevant*

The visual images whose connection with the word "meaning" can be traced may, like the kinæsthetic images, be roughly divided into those where the association is direct and those where it involves

symbolism. Under the first head we have a group of cases where "meaning" is represented by the visual image of an object used in getting the meaning of a word. Just as the most common kinæsthetic image was that of frowning, so the most common visual image was that of a dictionary, which occurred in 13 cases. One observer reported the visual image of a dictionary page; one that of the page with a hand pointing to a word. The image of a person in the attitude or with the facial expression of one looking for a meaning was also met with in several cases: two observers reported seeing the image of a person with a puzzled face, one that of a thoughtful face, one that of a thoughtful face suddenly clearing, four observers that of a person bending over a desk or a dictionary. Visual images of words also occurred. One observer reports "a word in heavy black type followed by an equality sign and other words in small type, each of which has an authority after it in abbreviation." Another sees a word with two or three lines of writing underneath. A third sees a printed page with space between the words and the paper as if the words were raised. So far as this latter feature is concerned the image may be classed as irrelevant, since its association with "meaning" is not clear. Another case of an image which is partly relevant and partly irrelevant is that reported by an observer who saw the word "meaning" itself in print, "the letters having a sneering expression." In the case of the following images the connection with "meaning" is quite direct: "a scowling person pointing at a word and asking me what it means;" "several people discussing."

The number and variety of the visual images which stood for "meaning" through a symbolism which represented the actual mental processes involved in finding the meaning of a word, instead of merely giving the bodily movements or physical objects connected with the expression of these mental processes, as a frown or a dictionary, were much greater than the number and variety of the kinæsthetic images belonging to the same class. These visual images may best be considered in groups according to the particular feature which they emphasize of the mental processes involved in seeking meaning.

(1) *A word and its meaning are equivalent.* Four observers saw an equality sign; one observer saw an equation; one observer describes her image as that of "a large grey bulk with an equality sign, on the other side of which is the bulk broken into small pieces." The equality between a word and its meaning is constituted by the fact that word and meaning have the same associative tendencies.

(2) *Meaning is something to be grasped.* One observer sees "a knotted and gnarled hand extended as if to grasp something." Another describes "something reaching out with tentacles to grasp an idea." Still another sees "a dark brown object with countless dark arms, gathering in more of the brown substance." The symbolism of grasping is probably derived from the fact that meanings are usually complex ideas, whose parts have to be attended to in rapid succession, so that their relations appear.

(3) *Meaning is something to be unravelled or disentangled.* The following images are due to this conception of meaning: "a white background with a faint tracery of intertwined and knotted lines;" "a tangle of fine lines all leading to a black centre;" "a machine stitching and unravelling." The disentangling or unravelling metaphor is doubtless also due to the fact that meanings are complex. While the metaphor of grasping refers to the necessity of *rapid* passage of attention from one element in a meaning to another, so that the

relations may be apparent, the metaphor of disentangling seems to refer to the necessity of definitely attending to the different elements; in other words, to the need of not passing too rapidly from one to another.

(4) *Meaning is the inner aspect.* The following images are evidently based upon this feature of meaning: "Something within something—children's blocks fitting one inside another;" "The innermost part of something which like a nut has an important inner part and less important outer ones;" "A paper bag with a twisted top which opens up;" "A man holding a bushel basket and pouring many silver dollars out;" "A square box, with a piece of string coming from a hole in the centre of the cover;" "The inside of a square box, with something coming out of the front;" "A white something covering something;" "A bronze jar into which I wish to peer;" "Something unfolded piece by piece, like the flaps of an envelope, or petals, to get at the center." As it requires some physical effort to get at the inside of a physical object, so it requires more strained attention to make the meaning of a word or sentence focal than merely to produce the words. Closely akin to this metaphor is that of *digging*, which we found among the purely kinæsthetic images, and which occurs also with visual accompaniments: "Shovel digging into something dark revealing light;" "Some dark substance being parted with hands to get at bright clear object seen in depths." The same aspect of remoteness is involved in the following images: "A spot at the far distant end of a long cone-shaped opening through tiers of layers; the openings in the tiers are, in some cases, eight, in some cases, six-sided,—each opening being smaller than the one before it."

(5) *To get at meaning is to make clear, to illuminate.* This very interesting aspect of the process of getting at meaning was evidently foremost in the minds of a number of our observers. The last two examples quoted under the previous heading give evidence of its influence, and the following show it plainly: "A cloudy sky suddenly clearing;" "A streak of light against a dark ground;" "A single light on a dark ground;" "A dark spot on which a bright light is suddenly thrown;" "Something dark opening up and disclosing a light spot [this involves also the 'inner aspect' idea];" "A dark ditch with a single bright stone at the bottom;" "A dark room with a small glowing light in one corner;" "A black space through which comes a thin radiant stream of light;" "The sun coming from behind a cloud;" "A dark cloud which has just passed over a mountain that is very distinct;" "Many small dark clouds obscuring much light;" "Lighting a candle;" "A glass of dirty water and something dropped into it to make it clear;" "A ball of opaque glass gradually becoming crystal." Why does the metaphor of light coming into the midst of darkness express the mental process of getting at meaning? Is it not principally because darkness and failure to understand are both conditions which produce stagnation and lack of change in consciousness; darkness because it checks movement, and lack of understanding because it checks a free play of associations?

b. *Irrelevant*

The numbers of images whose associative connection with the word "meaning" is obscure was much larger in the visual and visual-kinæsthetic classes than in the purely kinæsthetic class. Doubtless the far greater richness and variety of visual experience as compared with kinæsthetic experience is a sufficient reason for this fact.

Some associative connection does of course exist in all these irrelevant images, and now and then one may hazard a conjecture as to its nature, but only a conjecture. Even in the images classed as relevant there is much that cannot be accounted for: one can see why "light in darkness" should express "meaning," but one cannot explain, and very likely the observer herself could not, why the particular image of "a ball of opaque glass gradually becoming crystal" made its appearance. The visual images for which no associative connection could with any certainty be predicated were the following: A circle; a soft pliable mass of clay; an empty picture frame (possibly these two referred to the abstract nature of the word, no particular meaning being referred to, but meaning in general); a dark grey round substance; a flickering candle; a rolled piece of parchment tied with a ribbon; an oval greyish-white convoluted space with a solid dome over it; a vast plain extending beyond the reach of the eye; the shell of an English walnut, the two halves fitting closely together; little sprites gesticulating wildly; a little girl falling down stairs and skinning her knee; a very bright, rather transparent glow over the whole inner field of vision; a hard small dull yellow surface; a blue green color and a pair of arms with boxing gloves, ready for action; something brown like baked beans; a cold blue long spike; a long sharp knife.

To base conclusions on the vexed question as to the psychological nature of meaning upon these results from unpractised observers would of course be unjustifiable. Incidentally, it may be noted that many of these images are undoubtedly suggested rather by current phrases in ordinary speech, such as "unravelling the meaning," than by the actual experience of the observers in getting at meanings. Yet such current phrases express certain actual experiences in the intellectual life of human beings: they are the records of introspection, however crude; they represent certain features that naturally belong to the process of arriving at meanings. Whether the following statement is an adequate description of a meaning or not, it expresses those aspects of meaning which are apparently most striking and most readily embodied in symbolic form: A meaning is a complex idea, suggested by association with that of which it is the meaning. Its parts must be attended to (meaning must be unravelled, disentangled), usually with some effort (meaning must be dug out; it is the inner aspect), in rapid succession to make their relations apparent (meaning must be grasped). When it is attended to, its further associative tendencies are recognized as identical with those of the word or idea whose meaning it is (meaning is an equivalent). But the word or idea of which it is the meaning did not itself set into activity these further associative tendencies: a block or stoppage in associative processes occurred which made the process of attending to the meaning necessary: the occurrence of the meaning relieved this stoppage (meaning is an illumination).